PORTLAND HARBOR RI/FS

ROUND 3 SAMPLING FOR PRE-BREEDING WHITE STURGEON (*ACIPENSER TRANSMONTANUS*) TISSUE FIELD SAMPLING REPORT

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The Lower Willamette Group

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CAS	Columbia Analytical Services, Inc.
DGPS	differential global positioning system
EDD	electronic data deliverable
EPA	US Environmental Protection Agency
FDA	US Food and Drug Administration
FSP	field sampling plan
GI	gastrointestinal
hp	horsepower
ID	identification
Integral	Integral Consulting, Inc.
LWG	Lower Willamette Group
NAD83	North American Datum of 1983
NOAA	National Oceanic and Atmospheric Administration
NRT	Natural Resource Trustees
ODEQ	Oregon Department of Environmental Quality
ODFW	Oregon Department of Fish and Wildlife
PAH	polycyclic aromatic hydrocarbon
PIT	passive integrated transponder
QA/QC	quality assurance and quality control
RM	river mile
SDG	sample delivery group
SOP	standard operating procedure
USFWS	US Fish and Wildlife Service
Windward	Windward Environmental LLC
ww	wet weight

1.0 INTRODUCTION

This field sampling report describes the objectives and procedures for the Round 3 sampling event to collect pre-breeding white sturgeon (*Acipenser transmontanus*) tissue within the Portland Harbor Superfund site (River Mile [RM] 2.0 to RM 11), hereafter referred to as the Study Area, for laboratory chemical analysis. Determining the concentrations of selected chemicals in pre-breeding white sturgeon tissue will facilitate the completion of the baseline ecological risk assessment, as outlined in the *Portland Harbor Remedial Investigation/Feasibility Study Programmatic Work Plan* (Integral et al. 2004).

1.1 OBJECTIVE OF SAMPLING EFFORT

The specific objective of the Portland Harbor Round 3 pre-breeding white sturgeon tissue sampling effort was to obtain site-specific pre-breeding white sturgeon whole-body tissue samples for use in determining whether chemicals of interest in field-collected white sturgeon tissue from the Portland Harbor site potentially pose unacceptable ecological risks to the sturgeon themselves

1.2 REPORT ORGANIZATION

The remaining sections of this document describe the field procedures and analysis plan for the pre-breeding white sturgeon tissue sampling effort. Sections 2.0 and 3.0 present the sturgeon sampling program and procedures, respectively. Laboratory analyses are described in Section 4.0. Data management is described in Section 5.0, and reporting is described in Section 6.0. Cited references are listed in Section 7.0. Supporting information, including field collection and processing logbooks and forms and completed field collection and protocol modification forms, are provided in Appendix B.

2.0 PRE-BREEDING WHITE STURGEON SAMPLING PROGRAM

Five areas (i.e., reaches) were sampled for pre-breeding white sturgeon (*Acipenser transmontanus*) between February 19 and March 6, 2007 (Figure 2-1). Sampling procedures for the collection of sturgeon followed those detailed in the field sampling plan (FSP) (Windward 2007) and are summarized in Section 3.0.

Representatives of the regulatory agencies and trustees were present throughout the sampling effort to oversee field operations. Observers were Eric Blischke, Joe Goulet and Dan Terpening from the US Environmental Protection Agency (EPA); Jeremy Buck, Ken Lujan, and Mike Szumski from US Fish and Wildlife Service (USFWS); Ruth Farr from the Oregon Department of Fish and Wildlife (ODFW); Rob Neeley from the National Oceanic and Atmospheric Administration (NOAA); Jennifer Peterson from the Oregon Department of Environmental Quality (ODEQ); Sherrie Duncan from Ridolfi Inc.; Chris Thompson and Brent Finley from Environment International Ltd.; and Erin Madden on behalf of the Nez Perce Tribe.

2.1 SAMPLING VESSEL

Sturgeon collection was performed from a 20-ft jet sled with center console steering, provided by Ellis Ecological Services, Inc., of Estacada, Oregon. The sampling vessel was powered by a 90-horsepower (hp) Honda outboard main motor with an 8-hp outboard auxiliary motor. The vessel was equipped with a depth finder at the helm at mid-deck. A snatch block and cam were attached to the forward starboard railing of the vessel and were used to facilitate the setting and retrieval of the sturgeon long lines (hereafter referred to as set lines). A large cooler was placed in front of the helm for use as a temporary live tank to hold all sturgeon captured by set lines. The sturgeon were immediately transported to the support vessel upon retrieval of each set line.

A 24-ft open-hull aluminum North River Scout provided by Bite Me Guide Service LLC of Keizer, Oregon, was used for angling activities. The angling vessel was powered by a 250-hp Yamaha outboard main motor with an 8-hp outboard auxiliary motor. The helm and depth finder were located at the aft deck, seating was provided at mid-deck, and there was a large space at the forward deck for the temporary live tank. Sturgeon caught during angling were transferred to the support vessel.

The support vessel, a 22-ft Alumaweld Intruder provided by Benthic LLC of Portland, Oregon, was powered by a 150-hp Mercury outboard main motor with a 9.9-hp outboard auxiliary motor. The vessel was equipped with a depth finder. The aft deck was open and had a large space to hold an 80-gal. cooler that was used as a temporary live tank to hold all captured sturgeon until they were measured, assessed, and either released live or transported to the field laboratory for tissue processing.

The covered cabin included the helm and a dry work area with seating for completing paperwork (e.g., field forms).

2.2 NAVIGATION AND STATION POSITIONING

On-board navigation equipment was provided and operated by Integral Consulting, Inc. (Integral), during deployment and retrieval. Horizontal control was achieved using a computer-integrated, differential global positioning system (DGPS). The horizontal projection used for all sampling activities was the North American Datum of 1983 (NAD83).

The navigation system on the sampling vessel consisted of a Trimble® (Pro XRS) DGPS unit that received real-time differential corrections from the continuously operating reference station at Appleton, Washington. The Trimble® DGPS antenna was secured on top of the davit to achieve the most accurate position for each sample. Positional accuracies on the order of ± 2 to 3 m were achieved with this system. The Trimble® DGPS receiver output was displayed and recorded (in real time) using integrated navigation software (Trimble® TerraSync™ Version 2.50) on a laptop computer.

The integrated navigation system displayed the vessel's position relative to the target sampling location in plan view on the laptop screen. The screen display and numeric navigation data, including range and bearing to the target sampling location, assisted the vessel operator in approaching a sampling position.

DGPS data logging was initiated for each set line at the beginning and ending points. Each point was marked by a buoy that was attached to an anchor by a float line. A depth for each beginning and ending point was also recorded. Table 2-1 presents the coordinates, depths, times and dates of deployment and retrieval, and soak time for each set line. At sites where angling was conducted, the coordinates for the single point location were logged and a depth recorded. Table 2-2 presents the coordinates, depth, and amount of time spent angling at each location.

Table 2-1. Round 3 White Sturgeon (*Acipenser transmontanus*) Set Line Locations

Sampling Reach	Set Line Location	Deployment		Retrieval		Soak Time (hours:minutes)	Starting Set Line Coordinates[a]		Starting Depth (ft)	Ending Set Line Coordinates[a]		Ending Depth (ft)
		Date	Time	Date	Time		X (Easting)	Y (Northing)		X (Easting)	Y (Northing)	
LW3-ST001	1	2/19/07	9:45	2/20/2007	9:38	23:53	7615340	722637	32	7615411	722929	32
	2	2/19/2007	10:00	2/20/2007	14:14	28:14	7615571	722763	47.5	7615599	723074	48
	3	2/20/2007	14:32	2/21/2007	11:05	20:33	7615622	722826	38.5	7615680	723130	46.5
	4	2/21/2007	11:05	2/22/2007	13:30	26:25	7615355	722395	36.5	7615386	722683	32.5
	5	2/22/2007	13:56	2/23/2007	11:50	21:54	7615631	723087	43	7615652	723392	45
	6	2/25/2007	13:30	2/26/2007	11:30	22:00	7615398	722457	37	7615520	722752	44
	7	2/26/2007	11:30	2/27/2007	14:47	27:17	7617726	725366	43	7617777	725668	39
	8	2/27/2007	14:47	2/28/2007	12:27	21:40	7615718	722893	47	7615747	723194	47
	9	2/28/2007	12:27	3/1/2007	11:12	22:45	7615427	722460	50	7615592	722726	45
	10	2/28/2007	13:07	3/1/2007	11:50	22:43	7615589	723856	45	7615669	724119	48
	11	3/1/2007	11:16	3/2/2007	10:55	23:39	7617349	724549	57	7617529	724815	56
	12	3/1/2007	11:55	3/2/2007	10:15	22:20	7615794	724483	42	7615894	724734	32
	13	3/4/2007	14:20	3/5/2007	12:40	22:20	7617532	724974	55	7617396	724691	58
	14	3/4/2007	14:35	3/5/2007	13:00	22:25	7616317	725806	43	7616214	725610	38
	15	3/5/2007	12:50	3/6/2007	10:45	21:55	7616933	724818	47	7616814	725110	46
	16	3/5/2007	13:15	3/6/2007	11:00	21:45	7616181	725473	38	7616254	725670	43
	17	3/6/2007	10:20	3/6/2007	11:25	1:05	7615629	722878	45	7615565	722623	44
	18	3/6/2007	10:30	3/6/2007	11:25	0:55	7615738	724125	43	7615585	723873	45
	19	3/6/2007	11:20	3/6/2007	11:25	0:05	7615416	722501	49	7615428	722220	50
LW3-ST002	1	2/19/2007	10:10	2/20/2007	13:40	27:30	7617124	718536	46	7617014	718794	48
	2	2/19/2007	10:20	2/20/2007	10:29	24:09	7616172	717370	38.5	7616104	717639	42
	3	2/20/2007	14:04	2/21/2007	11:15	21:11	7616975	718962	37	7616922	719241	38
	4	2/21/2007	11:15	2/22/2007	12:18	25:03	7616935	718986	48	7616863	719252	44.5
	5	2/22/2007	13:28	2/23/2007	11:20	21:52	7616775	719129	51	7616730	719392	53
	6	2/25/2007	14:00	2/26/2007	10:23	20:23	7617012	718832	42	7616923	719097	40
	7	2/26/2007	11:00	2/27/2007	13:07	26:07	7616861	718990	40	7616910	719256	48
	8	2/27/2007	14:10	2/28/2007	12:01	21:51	7616950	718992	40	7616856	719230	50
	9	2/28/2007	12:01	2/28/2007	12:41	0:40	7616926	718984	42	7616879	719233	44

Table 2-1. Round 3 White Sturgeon (*Acipenser transmontanus*) Set Line Locations

Sampling Reach	Set Line Location	Deployment		Retrieval		Soak Time (hours:minutes)	Starting Set Line Coordinates[a]		Starting Depth (ft)	Ending Set Line Coordinates[a]		Ending Depth (ft)
		Date	Time	Date	Time		X (Easting)	Y (Northing)		X (Easting)	Y (Northing)	
LW3-ST003	1	2/19/2007	10:45	2/20/2007	12:57	26:12	7625931	704702	44	7625690	704807	36
	2	2/20/2007	13:11	2/21/2007	15:45	26:34	7625876	704666	21	7625629	704729	26
	3	2/21/2007	15:45	2/22/2007	10:47	19:02	7625397	704927	39.5	7625160	705108	46
	4	2/22/2007	11:20	2/23/2007	10:00	22:40	7625388	704994	48.5	7625136	705128	46.8
	5	2/25/2007	14:30	2/26/2007	9:50	19:20	7625663	704809	42	7625409	704941	49
	6	2/26/2007	9:50	2/27/2007	10:30	24:40	7626300	705580	46	7626061	705693	43
	7	2/27/2007	10:30	2/28/2007	11:00	24:30	7626229	705596	44	7625992	705777	41
	8	2/28/2007	11:15	3/1/2007	10:00	22:45	7625706	704772	48	7625476	704921	49
	9	3/1/2007	10:00	3/2/2007	9:25	23:25	7624312	706543	47	7624110	706710	47
	10	3/4/2007	13:57	3/5/2007	10:05	20:08	7624829	705291	47	7625090	705154	47
	11	3/5/2007	10:15	3/6/2007	8:50	22:35	7626235	705578	48	7625968	705726	46
	12	3/5/2007	11:10	3/6/2007	9:00	21:50	7625474	705909	43	7625723	705844	42
	13	3/5/2007	11:30	3/6/2007	9:15	21:45	7621423	709349	50	7621585	709138	47
LW3-ST004	1	2/20/2007	11:54	2/21/2007	15:10	27:16	7628578	703618	51	7628398	703796	49
	2	2/21/2007	15:10	2/22/2007	9:54	18:44	7627080	703761	48	7626868	703928	47
	3	2/22/2007	11:08	2/22/2007	15:05	3:57	7627285	703585	49	7627069	703758	48.5
	4	2/22/2007	15:05	2/23/2007	9:35	18:30	7627127	703706	47.5	7626910	703888	47
	5	2/25/2007	15:00	2/26/2007	9:20	18:20	7627270	703526	45	7627080	703728	43
	6	2/26/2007	9:30	2/27/2007	9:50	24:20	7627655	704393	49	7627475	704573	40
	7	2/27/2007	9:50	2/27/2007	9:55	0:05	7627617	704429	nc	7627439	704584	nc
	8	2/27/2007	12:05	2/28/2007	10:50	22:45	7627594	704439	42	7627469	704533	51
	9	2/28/2007	10:50	3/1/2007	9:40	22:50	7628037	704153	36	7627819	704286	39
	10	2/28/2007	14:42	3/1/2007	8:32	17:50	7630821	701775	44	7630583	701840	40
	11	3/1/2007	9:05	3/2/2007	8:39	23:34	7630814	701756	42	7630549	701931	39
	12	3/1/2007	11:55	3/2/2007	9:11	21:16	7627581	704423	42	7627426	704553	52
	13	3/4/2007	13:35	3/5/2007	8:25	18:50	7630350	702004	38	7630611	701824	40
	14	3/4/2007	13:45	3/5/2007	8:40	18:55	7630780	701777	42	7631049	701692	40
	15	3/5/2007	9:15	3/5/2007	10:05	0:50	7631197	701550	46	7630924	701588	48
	16	3/5/2007	9:22	3/5/2007	10:10	0:48	7630661	701602	46	7630380	701694	42

Table 2-1. Round 3 White Sturgeon (*Acipenser transmontanus*) Set Line Locations

Sampling Reach	Set Line Location	Deployment		Retrieval		Soak Time (hours:minutes)	Starting Set Line Coordinates[a]		Starting Depth (ft)	Ending Set Line Coordinates[a]		Ending Depth (ft)
		Date	Time	Date	Time		X (Easting)	Y (Northing)		X (Easting)	Y (Northing)	
LW3-ST005	1	2/20/2007	12:05	2/21/2007	12:30	24:25	7637799	695514	78	7637677	695630	75
	2	2/21/2007	14:00	2/22/2007	9:20	19:20	7637017	696170	46	7636793	696311	47
	3	2/22/2007	9:20	2/22/2007	15:10	5:50	7637576	695818	46	7637329	695948	50
	4	2/22/2007	15:10	2/23/2007	8:30	17:20	7636826	696280	47	7636618	696468	42.5
	5	2/25/2007	15:30	2/26/2007	8:55	17:25	7637517	695897	44	7637278	696041	45
	6	2/26/2007	9:00	2/26/2007	12:00	3:00	7636987	696186	37	7636791	696384	44
	7	2/26/2007	12:25	2/27/2007	9:06	20:41	7637021	695921	68	7636827	696122	80
	8	2/27/2007	9:06	2/28/2007	8:43	23:37	7637991	695525	57	7637799	695726	47
	9	2/28/2007	9:30	2/28/2007	14:16	4:46	7638081	695597	42	7637871	695738	43

[a] NAD83, High-Accuracy Reference Network (international feet).

Table 2-2. Round 3 White Sturgeon (*Acipenser transmontanus*) Angling Locations

Sampling Reach	Angling Location	Angling Date	Time Spent Angling (hours:minutes)	Angling Coordinates[a]		Depth (ft)
				X (Easting)	Y (Northing)	
LW3-ST001	a	2/21/2007	0:33	7615429	721999	45
	b	3/5/2007	2:15	7615442	722224	52
	c	3/6/2007	1:40	7615446	721487	56
	d	3/6/2007	1:05	7615683	722861	47
LW3-ST002	a	2/21/2007	0:19	7619622	711540	77
	b	2/21/2007	0:16	7616819	718962	48
LW3-ST003	a	2/20/2007	5:30	7625900	705746	48
	b	2/21/2007	0:33	7625701	705788	49
	c	2/21/2007	1:06	7624063	706606	62
LW3-ST004	a	2/21/2007	0:44	7631342	700908	51

[a] NAD83, High-Accuracy Reference Network (international feet).

3.0 STURGEON SAMPLING PROCEDURES

This section presents the sampling and processing procedures for all sturgeon collected. The procedures followed those detailed in the FSP (Windward 2007) and *Procedure for Sampling Fish, Collecting Tissues, and Conducting an External Fish Health Assessment* (USFWS 2007), also referred to as the standard operating procedure (SOP). The SOP is provided in Appendix A; supplemental data collection efforts done for the Natural Resource Trustees (NRT) (e.g., USFWS) are discussed in Appendix B. Field notes, field collection forms, sample processing forms, and protocol modification forms are provided in Appendix C; photo documentation of field sampling and field laboratory processing activities is provided in Appendix D (both Appendices C and D are on an accompanying compact disk).

3.1 STURGEON COLLECTION

A total of 403 white sturgeon was collected with set lines and by angling. Of this number, 384 were smaller than the legal size and subsequently released at the site of capture. Of the 19 legal-sized (42- to 60-in.) sturgeon collected, 1 was released accidentally, and 3 were released because the target quota for the reach in which they were caught had been met. A total of 15 legal-sized white sturgeon was retained for chemical analysis. In addition, one sub-legal-sized sturgeon was retained as a practice health assessment and dissection specimen.

Set lines were used to collect 381 white sturgeon from February 19 through March 6, 2007, for tissue analysis (Table 3-1). Each set line was 80 meters in length and consisted of a 0.64-cm nylon main line with 18 circle halibut hooks that were baited with pickled squid and attached at 4.6-m intervals. Hook lines consisted of a 0.64-cm swivel snap and a 0.7-m-long gangion line tied between the swivel and the hook. The hooks used were size 7 (12/0) circle halibut hooks. The use of large hooks reduced the likelihood of other fish species being captured; no by-catch was captured. The barbs on all hooks were removed to facilitate release of fish not in the appropriate size range. Five set lines were deployed daily from the sampling vessel and set generally parallel to the shore. An anchor and float line was attached to each end of the main line, and the set lines were allowed to soak overnight. Upon set line retrieval, sturgeon were brought on board the sampling vessel and the hooks and any visible bait were removed from the sturgeon. The sturgeon were then placed in a live tank filled with site water until the entire set line was retrieved and then transferred to a live tank with aerated site water on the support vessel.

Table 3-1. Number of White Sturgeon (*Acipenser transmontanus*) Caught by Set Lines

Sampling Reach	Set Line Location	Number Sturgeon Caught	
		Legal Size (42 to 60 inches)	Sub-Legal Size (< 42 inches)
LW3-ST001	1	0	1
	2	0	7
	3	1	15[a]
	4	0	5
	5	0	12
	6	0	4
	7	0	9
	8	0	5
	9	0	2
	10	0	7
	11	0	13
	12	0	11
	13	0	8
	14	0	7
	15	2	8
	16	0	11
	17	0	0
	18	0	2
	19	0	1
LW3-ST002	1	0	7
	2	0	7
	3	1	10
	4	2[b]	13
	5	0	9
	6	1	8
	7	0	8
	8	1[c]	6
	9	0	0
LW3-ST003	1	0	1
	2	0	3
	3	2	4
	4	0	3
	5	0	2
	6	0	4
	7	0	2
	8	0	0
	9	0	6
	10	0	5
	11	1	4
	12	1[c]	8
	13	1[c]	8

Table 3-1. Number of White Sturgeon (*Acipenser transmontanus*) Caught by Set Lines

Sampling Reach	Set Line Location	Number Sturgeon Caught	
		Legal Size (42 to 60 inches)	Sub-Legal Size (< 42 inches)
LW3-ST004	1	0	4
	2	0	11
	3	0	1
	4	0	5
	5	0	3
	6	1	8
	7	0	0
	8	0	3
	9	0	6
	10	0	12
	11	0	12
	12	1	4
	13	0	10
	14	1	11
	15	0	2
	16	0	2
LW3-ST005	1	0	8
	2	0	2
	3	0	1
	4	1	5
	5	1	0
	6	0	0
	7	0	2
	8	1	3
	9	0	1
Total		**19**	**362**

[a] One sub-legal-sized (28-in.) sturgeon was retained for use as a health assessment training, blood draw, and dissection practice specimen as requested by Jeremy Buck (USFWS), approved by Joe Goulet (EPA), and granted by ODFW (Scientific Taking Permit Number OR2007-3840M4).

[b] One legal-sized sturgeon was released accidentally.

[c] Released because target quota for the reach was met.

NA – not applicable; none caught

Although it was not originally planned in the FSP, EPA approved additional efforts to collect more sturgeon by supplementing the set lines with an angling effort. Twenty-two additional sturgeon were caught by angling on February 20 and 21 and March 5 and 6, 2007 (Table 3-2). However, no legal-sized (42- to 60-in.) sturgeon were captured during angling, and all sub-legal-sized sturgeon were subsequently released. Custom-made rods with 50-lb lines and either a size 7-0 or 8-0 Gamakatsu hook, baited with either pickled squid or a combination of fresh frozen squid, smelt,

or herring were used during angling. Sturgeon that were caught were brought on board the angling vessel; the hook and any visible bait in the mouth of the sturgeon were removed. The sturgeon were then placed in a live tank filled with site water until picked up by the field crew on the support vessel.

Table 3-2. Number of White Sturgeon (*Acipenser transmontanus*) Caught by Angling

Sampling Reach	Angling Location	Number of Sturgeon Caught	
		Legal (42 to 60 inches)	Sub-Legal (< 42 inches)
LW3-ST001	a	0	1
	b	0	4
	c	0	1
	d	0	2
LW3-ST002	a	0	0
	b	0	1
LW3-ST003	a	0	1
	b	0	5
	c	0	0
LW3-ST004	a	0	7
Total		**0**	**22**

3.2 FIELD (ON SITE) PROCESSING

On the support vessel, each sturgeon was measured for fork and total length and electronically scanned for the presence of any passive integrated transponder (PIT) tags.[1] Although none of the sturgeon caught were PIT-tagged, one legal-sized sturgeon had been previously captured by Washington Department of Fish and Wildlife and was tagged with a spaghetti wire. It was retained and processed in the field laboratory for tissue chemical analysis. Sturgeon that measured less than 42 in. (e.g., sub-legal size) were released live, with as little handling as possible, at the site of capture. At the request of USFWS and NRT, and under EPA supervision, external health assessments were performed on 150 of the 384 sub-legal-sized sturgeon caught before they were released.[2] Also as requested by USFWS and NRT, and approved by LWG and EPA, six sub-legal-sized sturgeon were used for practice blood draws before they were released live at the site of capture.

Sturgeon that measured within the targeted legal size range (42 to 60 in.) were kept live in the temporary holding tank for transport to the field laboratory for a more comprehensive health assessment and processing for tissue chemical analyses. A total

[1] Training on the use of an electronic scanner to detect PIT tags was provided by Ruth Farr (ODFW).

[2] One sub-legal-sized (28-in.) sturgeon was retained for use as an external health assessment, blood draw, and dissection practice specimen as requested by Jeremy Buck (USFWS), approved by Joe Goulet (EPA), and granted by ODFW (Scientific Taking Permit Number OR2007-3840M4).

of three sturgeon from each reach (or a total of 15 from the Study Area) was collected for tissue analysis. All additional legal-sized sturgeon were released live when the target quota for a particular reach had been met. Field catch data and fish health assessment forms for all sturgeon are provided in Appendix C.

3.3 FIELD LABORATORY (OFF SITE) PROCESSING

This section summarizes the steps taken during sturgeon processing. The methods are described in further detail in Section 3.2 of the FSP (Windward 2007) and the SOP (USFWS 2007). Upon arrival at the field laboratory, all 15 sturgeon were processed under clean room procedures (EPA 2000).[3] USFWS provided training on internal and external examination and dissection procedures to the Windward field team and NRT representatives.

Prior to euthanization, each sturgeon was weighed on a 100-lb-capacity hanging scale lined with aluminum foil, and then measured for fork and total lengths before an external health assessment was conducted (Table 3-3).[4] All observations and abnormalities were recorded on sample processing forms (Appendix C), and abnormalities were photographed as deemed necessary.

Table 3-3. Round 3 White Sturgeon (*Acipenser transmontanus*) Whole-Body Weights and Length Measurements

Sturgeon ID	Whole-body Weight (lb ww)	Fork Length (in.)	Total Length (in.)
LW3-ST001-01	14.5	39.5	44
LW3-ST001-02	14.0	37	43
LW3-ST001-03	22.5	43.5	50.5
LW3-ST002-01	18.0	37.5	43.5
LW3-ST002-02	13.5	39	44
LW3-ST002-03	17.5	40	45.5
LW3-ST003-01	15.0	37.5	43
LW3-ST003-02	18.0	39.5	45
LW3-ST003-03	21.0	43	48
LW3-ST004-01	21.5	42.5	48
LW3-ST004-02	13.0	37	42
LW3-ST004-03	13.5	36	42.5
LW3-ST005-01	15.5	41	46.5

[3] One sub-legal-sized (28-in.) sturgeon was also retained for use as a health assessment training, blood draw, and dissection practice specimen as requested by Jeremy Buck (USFWS), approved by Joe Goulet (EPA), and granted by ODFW (Scientific Taking Permit Number OR2007-3840M4).

[4] Approximately 32 mL of blood were also collected from each sturgeon by USFWS or other NRT representative.

Table 3-3. Round 3 White Sturgeon (*Acipenser transmontanus*) Whole-Body Weights and Length Measurements

Sturgeon ID	Whole-body Weight (lb ww)	Fork Length (in.)	Total Length (in.)
LW3-ST005-02	20.0	42	48
LW3-ST005-03	14.5	37.5	42.5

ID – identification
ww – wet weight

For euthanization, each sturgeon was placed on an aluminum foil-lined stainless steel tray to collect any blood spillage and then pithed through the notochord at the base of the head with a decontaminated steel blade with the aid of a 2-lb metal mallet. The sturgeon was then transferred to an aluminum foil-lined table for dissection and an internal examination.

Histopathology samples of external abnormalities were excised, photographed, collected, weighed, recorded, and stored in a clean, labeled 2-oz jar filled with 10% buffered formalin solution (Table 3-4).[5] Two internal histopathology samples were also collected during the dissection and internal examination. Histopathology samples were taken as suggested by USFWS and approved by EPA.

Table 3-4. Round 3 White Sturgeon (*Acipenser transmontanus*) Histopathology Sample IDs and Weights

Sample ID	Sample Weight (grams)
LW3-ST001-02a	1.5
LW3-ST001-02b	2.4
LW3-ST001-02c	0.5
LW3-ST003-03a	0.3
LW3-ST003-03b	0.2
LW3-ST003-03c	1.2
LW3-ST003-03d	0.7
LW3-ST004-02a	1.3
LW3-ST005-01a	1.3
LW3-ST005-02a	1.1
LW3-ST005-02b	0.7
LW3-ST005-02c	0.6
LW3-ST005-02d	2.0
LW3-ST005-03a	1.0

[5] All histopathology samples remain under Windward's custody, pending further direction from EPA.

The dissection, internal examination, and tissue collection were conducted after the collection of any histopathology samples. The liver and stomach content removal procedures were conducted according to the FSP (Windward 2007) and SOP (USFWS 2007). Because the gall bladder was attached to the liver at a number of points, extreme caution was used while separating the liver to avoid puncturing the gall bladder and releasing bile fluid. During the separation process, the whole liver and attached gall bladder were held over the body cavity to reduce the loss of bile fluid in case the gall bladder was punctured. After separation, general observations of liver condition or anomalies were recorded. The whole liver was then weighed before being placed in a clean, labeled glass sample jar and stored frozen pending transport to the analytical laboratory. Table 3-5 provides the whole-liver weight for each sturgeon.

Table 3-5. Round 3 White Sturgeon (*Acipenser transmontanus*) Gender and Liver and Stomach Content Weights

Sturgeon ID	Liver Weight (g ww)	Stomach Content Weight (g ww)	Gender
LW3-ST001-01	57.2	0.0	female
LW3-ST001-02	49.0	2.5	male
LW3-ST001-03	92.1	0.9	female
LW3-ST002-01	58.8	0.0	male
LW3-ST002-02	59.9	2.1	male
LW3-ST002-03	59.4	0.6	female
LW3-ST003-01	59.3	19.8	male
LW3-ST003-02	77.1	2.1	male
LW3-ST003-03	97.2	1.0	female
LW3-ST004-01	120.9	112.6	male
LW3-ST004-02	58.6	4.8	male
LW3-ST004-03	54.9	2.4	male
LW3-ST005-01	62.4	1.9	female
LW3-ST005-02	98.5	0.5	female
LW3-ST005-03	62.2	2.4	male

ID – identification
ww – wet weight

Upon completion of the liver removal procedure, the gastrointestinal (GI) tract was removed and examined according to the FSP (Windward 2007) and SOP (USFWS 2007). After the GI tract, including the stomach cavity, was cut open, a clean stainless steel spoon was used to collect any prey items and digestive material; any pickled squid bait that was present was removed per EPA's request. Prey items were identified to the lowest taxonomy possible, and unidentifiable stomach contents were generally described and recorded on the sample processing form. Stomach contents were placed in a clean tared glass jar, weighed, and stored frozen pending transport to

the analytical laboratory. Table 3-5 provides the stomach content weight for each sturgeon.

After the GI tract was placed back into the body cavity, the gender of the sturgeon was determined by visually examining the gonads. Photographs were taken, and any additional observations were recorded on the sample processing form. The gender identified for each sturgeon is listed in Table 3-5.

The pectoral fin ray sample was then collected from either the left or right side of the sturgeon according to the SOP (USFWS 2007). The pectoral fin ray sample was placed in a tared and labeled envelope, weighed, and recorded on the sample processing form. Fin ray samples were placed in a quart-sized zip-lock bag and stored frozen pending shipment to ODFW for age analysis.

Upon completion, each sturgeon whole-body sample was wrapped in the aluminum foil that covered the table in order to retain any excess blood and bile fluids that may have spilled out of the body cavity during the examination and dissection process. Additional aluminum foil was wrapped around the sturgeon whole-body sample until it was completely enveloped and placed in an US Food and Drug Administration (FDA)-approved food-grade polyethylene plastic bag containing a sample identification (ID) label enclosed in a zip-lock bag. After the sample bag was sealed, it was labeled again before storage in a freezer, pending shipment to the analytical laboratory.

3.4 EQUIPMENT DECONTAMINATION

Equipment used to process (i.e., dissect) sturgeon was decontaminated before use. Tables and trays were covered with clean, heavy-duty aluminum foil. All utensils were decontaminated prior to the processing of each individual sturgeon. New weigh pans were used, and the aluminum foil on tables and trays was replaced. The process for decontaminating all utensils was done according to the following steps:

1. Rinse with potable water.
2. Scrub with brush and Alconox™ solution.
3. Rinse twice with deionized water.
4. Rinse with 0.1 N nitric acid.
5. Rinse with methanol.
6. Rinse with deionized water.

3.5 TISSUE SAMPLE IDENTIFICATION SCHEME

All samples were assigned a unique ID code, as described in Section 2.4.2 of the FSP (Windward 2007), which incorporated the project phase and sample type and was designed to meet the needs of field personnel, data management personnel, and data users. Sturgeon whole-body (minus liver) samples will be shipped in a 2-mil FDA-approved food-grade polyethylene plastic bag; liver tissue and stomach content samples will be shipped to the analytical laboratory in separate jars. Whole-body (minus liver) samples were labeled with the sampling round, tissue type and location, and individual ID (e.g., LW3-ST001-01), as well as the date and time the composite was created. The liver sample was labeled with the whole-body sample ID plus "(liver)," (e.g., LW3-ST001-01 (liver)). The stomach content sample was labeled with the sampling round, "SG" (for sturgeon gut content) and location, and individual ID (e.g., LW3-SG001-01). A replicate sturgeon tissue sample may be created in the analytical laboratory from any sturgeon sample and will be identified with an individual ID number 101 (e.g., LW3-ST001-101).

3.6 FIELD QUALITY ASSURANCE AND QUALITY CONTROL

Because of the large mass of each retained sturgeon, there will be sufficient sturgeon tissue collected to create a laboratory duplicate from any of the retained sturgeon. The field duplicate will be analyzed as a separate sample.

A sub-sample of the pickled squid used for baiting the set lines was collected in a clean 1-L glass jar, identified as "LW3-Sturgeon bait," and stored frozen. The bait will be shipped to the chemistry laboratory with the tissue samples for analysis of the full suite of chemicals. During sturgeon processing, all visible bait was removed from the sturgeon's mouth and GI tract.

Temperature blanks were not required because sturgeon were kept alive during transport to the field laboratory for processing. However, temperature blanks will be used to measure and ensure cooler temperature during shipment of tissue samples to the analytical laboratory. One temperature blank will be prepared and submitted with each cooler. The temperature blank will consist of a 50-mL plastic vial containing deionized water that will be packed into the cooler in the same manner as the rest of the samples and labeled "temp blank."

3.7 TISSUE SAMPLE HANDLING, STORAGE, AND TRANSPORTATION

Sturgeon collected from each sampling reach are currently stored frozen at the field laboratory, with the stomach contents and livers separated from the whole bodies. For shipment, the sturgeon whole-body, liver, and stomach content samples will be packed to prevent breakage and separated in the shipping container (i.e., cooler) by bubble wrap and/or other shock-absorbent material. Loose ice will be placed in the cooler to help keep the samples frozen.

Sturgeon samples will be delivered to the analytical laboratories once EPA approves a liver tissue homogenization and stomach content compositing approach, which is currently under development. Samples will be placed in the freezer at the laboratories upon receipt. After an agreement is reached with EPA and its partners, the sturgeon samples will be homogenized at the analytical laboratories.

3.8 CHAIN OF CUSTODY

Sample chain-of-custody procedures will follow the guidelines provided in Section 3.2.4 of the FSP (Windward 2007). The chain-of-custody form will be placed in a zip-lock bag and taped to the inside lid of each cooler. Each cooler will be sealed with shipping tape and three chain-of-custody seals, which will include the project name, date of shipment, and the name of the person sealing the cooler.

3.9 FIELD DOCUMENTATION

All field sampling activities and observations were noted in bound field logbooks (Appendix C). Information included the names of personnel, date, time, angling sampling location or beginning and ending coordinates and depths of each set line deployed, number of sturgeon collected upon retrieval, and general observations. Any changes that occurred at the site and in the field laboratory (e.g., personnel, responsibilities, deviations from the FSP) and the reasons for these changes were also documented in the field logbook or protocol modification forms.

A sample chain-of-custody form will be completed in the field laboratory for each composite tissue sample before it is shipped from the field laboratory to the analytical chemical laboratory. The chain-of-custody forms for the tissue samples will be kept in the project file at Integral's Olympia, Washington, office.

3.10 FIELD DEVIATIONS FROM THE FSP

Field deviations from the FSP (Windward 2007) included modifications to the placement of set lines, the retaining of one sub-legal sized sturgeon, and the performance of external health assessments on sub-legal-sized sturgeon. Protocol modification forms documenting the deviations are provided in Appendix C. These field deviations did not affect the data quality. EPA was consulted on deviations that involved a change in study design. The deviations were as follows:

- Set lines were generally placed parallel instead of perpendicular to the shoreline to reduce the possibility of entanglement with on-water traffic, as recommended by Ellis Ecological Services, Inc., and Bite Me Guide Service LLC. Joe Goulet (EPA) and Jeremy Buck (USFWS) were consulted regarding

the recommendation prior to the sampling event during a phone conversation on February 15, 2007.

- One sub-legal-sized (28-in.) sturgeon was retained for use as a health assessment training and dissection practice specimen. The request was made prior to the sampling event by Jeremy Buck (USFWS), approved by Joe Goulet (EPA) on February 15, 2007, and granted by ODFW (Scientific Taking Permit Number OR2007-3840M4).

- As requested by Jeremy Buck (USFWS), and under EPA supervision, external health assessments were conducted on 150 sub-legal-sized sturgeon between February 20 and 27, 2007, before they were released. The ODFW Scientific Taking Permit granted examinations (e.g., external health assessments) for up to 400 sturgeon.

- Practice blood draws were performed on six sub-legal-sized sturgeon before they were released. The request was made by USFWS and NRT, approved by the LWG and EPA on February 21, 2007, and granted by ODFW (Scientific Taking Permit Number OR2007-3840M4).

- In addition to using set lines to obtain sturgeon, angling was used to supplement the sampling effort after consultation with and approval from EPA on February 21, 2007.

4.0 LABORATORY ANALYSES

This section summarizes the chemical analyses to be performed on the field-collected sturgeon whole-body and liver tissue and stomach content samples. The chemical analyses of all tissue samples will be performed by two laboratories. Columbia Analytical Services, Inc. (CAS), of Kelso, Washington, will composite, if necessary, and homogenize the whole-body and liver tissue samples and complete analyses for phthalates and selected semivolatile organic compounds, polycyclic aromatic hydrocarbons (PAHs), mercury and other metals, butyltin compounds, and percent moisture. Axys Analytical Services, Ltd., of Sidney, BC, Canada, will complete analyses of lipids, organochlorine pesticides, polychlorinated biphenyl congeners, and dioxins and furans.

Prior to sampling, the Lower Willamette Group (LWG) had agreed with EPA to relinquish 40 g of liver tissue from each sturgeon to NRT, assuming that amount would not appreciably affect the whole-body chemical analysis results. However, the collected sturgeon had livers that weighed less than anticipated. Because this would reduce the analyses that could be conducted or possibly the detection limits, adversely affecting the chemical analysis data quality, LWG, EPA, and the NRT are currently considering the best alternative approach. Each sturgeon whole body (without liver) and remaining associated liver tissue sample will be analyzed in accordance with the resolution with EPA.

Under EPA's directives, stomach content samples were collected for metals, PAH, and moisture content analyses, which require 15 g of mass. Only 2 of the 15 retained legal-sized sturgeon had the stomach content mass required to analyze for these constituents. Whether the stomach contents for the remaining 13 legal-sized sturgeon should be analyzed as a composite sample is currently under discussion between LWG and EPA.

In the FSP approval letter, EPA (2007) directed LWG to provide NRT with a 40-g muscle tissue fillet (with skin) sample from each retained sturgeon. As agreed upon with EPA, fillet samples will be dissected by the analytical laboratory (CAS) and relinquished to the NRT.

In addition to chemical analyses on the tissue and stomach content samples, the pectoral fin ray samples will be analyzed to determine the age of each sturgeon. Upon completion of the sampling event, the pectoral fin ray samples were shipped to Ruth Farr (ODFW) for age analysis; age determination results will be reported in the final tissue summary report.

5.0 DATA MANAGEMENT

Once the chemical laboratories have completed their internal quality assurance and quality control (QA/QC) checks, they will submit the data in electronic format to Integral. Additional QA/QC checks will be performed at Integral; and if any problems are found in the electronic data deliverables (EDDs), the appropriate laboratory will be notified and asked to correct the problem and resubmit the EDD. When the EDD is correct and complete, the data will be checked again electronically by loading them into Integral's LWG project database. Any errors will prevent the EDD from loading until the error is corrected.

Each verified and accurate EDD will be provided with the full data package to the Round 3 data validation contractor (EcoChem of Seattle, Washington) for data review and validation. As EcoChem completes validation of the data by sample delivery group (SDG) or small groups of SDGs, the validated data will be merged into the project database.

Several queries have been set up in the permanent project database to translate the data structure to a form that is compatible with NOAA's Query Manager. The translated data will be imported into a NOAA-provided Microsoft® Access file that contains template tables for the Query Manager structure.

6.0 REPORTING

LWG-validated analytical laboratory tissue data will be provided to EPA in an electronic format and in SEDQUAL format within 150 days of completion of the sampling event. These data will also be incorporated into the remedial investigation report and baseline risk assessment, which will be prepared after all sampling and analysis rounds for the project have been completed.

A tissue summary report will be developed within 90 days after tissue data have been validated. Tissue chemistry results will be reported in tabular format in the data summary report. This report will be prepared by Windward and will include tissue analysis results as well as maps that display the chemistry results for selected analytes.

7.0 REFERENCES

EPA. 2000. Guidance for assessing chemical contaminant data for use in fish advisories. Volume 1: Fish sampling and analysis. Third ed. EPA 823-B-00-007. US Environmental Protection Agency, Washington, DC.

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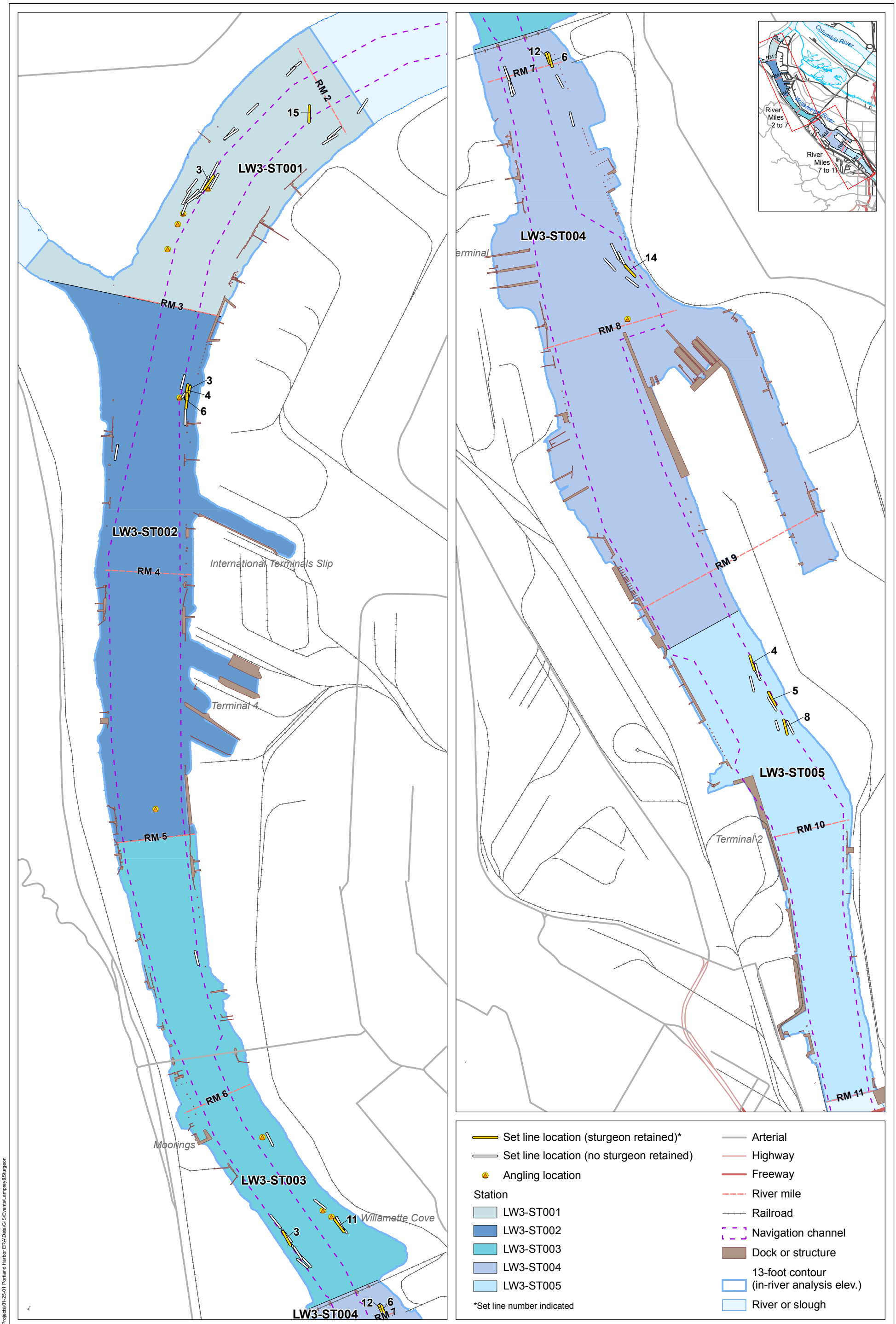

Figure 2-1. Round 3 White Sturgeon *(Acipenser transmontanus)* Tissue Sampling Locations

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Prepared by LSM 03-26-07 Map 2867, W:\Projects\01-25-01 Portland Harbor ERA\Data\GIS\Events\Lamprey&Sturgeon